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The Striped Bass

by Paul R. Nichols

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Fishery Leaflet 592

Cover Photo: Jumbo striped bass, average weight about 40 pounds,
taken in the haul seine fishery off the Outer Banks, N.C.

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CONTENTS

	Page
Introduction	1
Description	1
Geographic distribution	1
Natural history	2
Races	2
Spawning	2
Age and growth	2
Food and feeding	3
Migrations	3
Economic importance	4
Commercial fishery	4
Sport fishery	5
Research and management	5
References	5

The Striped Bass

By

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INTRODUCTION

The striped bass, a member of the sea bass family, Serranidae, is one of the most valuable and popular fishes along the coasts of North America. It is known scientifically as Roccus saxatilis (Walbaum), and commonly termed "striper" or "rockfish." The species' high-quality, white, flaky flesh places it in great demand as a food fish, and its voracious appetite and fighting ability make it an excellent game fish, avidly sought by a large and growing number of anglers. This species supports extensive commercial and recreational fisheries.

DESCRIPTION

The color, longitudinal stripes, general outline, and dorsal fin structure of the striped bass are sufficient to identify it from other species in its natural range (fig. 1). Its back may be olive-green to almost black, the sides are silver, and the belly is white. On each side seven or eight black stripes usually follow scale rows. The body is elongated and slightly compressed. The two top, or dorsal, fins are not joined at the base.

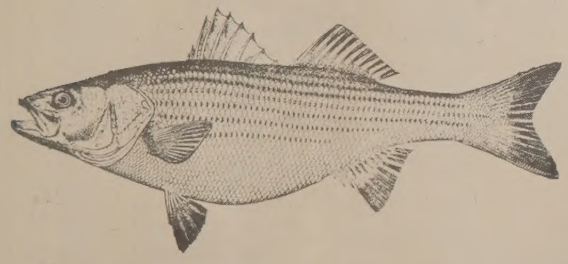


Figure 1.--The striped bass or rockfish.

Although there is little danger of confusing this fish with any other species in its natural geographical range, it could be confused with its fresh-water relatives, the yellow bass, Roccus mississippiensis, and white bass, R. chrysops. The yellow bass ranges from Minnesota and Wisconsin southward to Alabama and Texas. The white bass (locally sometimes called striped bass) is a native of the Mississippi River and Great Lakes drainages, but it has been widely introduced in reservoirs in the Midwest and Southwest.

GEOGRAPHIC DISTRIBUTION

The natural distribution of striped bass is coastal: inshore waters, bays, and coastal rivers are its haunts. It occurs on the Atlantic coast from the St. Lawrence River, Canada, to the St. Johns River, Fla., and in streams along the Gulf of Mexico from western Florida to Lake Pontchartrain, La. Chesapeake Bay and Albemarle Sound are the areas of greatest abundance.

The striped bass was introduced on the Pacific coast in the last quarter of the nineteenth century. In 1879 and 1882 a number of yearling fish were seined in the Navesink and Shrewsbury Rivers of New Jersey, taken across the continent by train, and planted in upper San Francisco Bay near Martinez, Calif. Only 435 bass survived the rigors of travel. Yet by 1889, 10 yr. (years) after the first plant, the species supported important fisheries in central California. The species has multiplied rapidly and has become the object of intensive, as well as prosperous, sport and commercial fisheries. The range on the Pacific coast now extends from San Diego, Calif., to the Columbia River, Oreg.

Attempts to establish naturally reproducing stocks of the striped bass in fresh water have had limited success. The species has become established above Pinopolis Dam in the Santee-Cooper River System of South Carolina, in Kerr Reservoir on the headwaters of the Roanoke River of North Carolina and Virginia, in Millerton Lake of California, and possibly in Kentucky Lake of Kentucky and Tennessee.

Revision of Fishery Leaflet 451, May 1958.

NATURAL HISTORY

The basic biology of the striped bass is fairly well known. The striped bass is a relatively large fish, a rapid swimmer, and a carnivorous feeder and grows rapidly. It produces a great many young, of which only a few per female survive to maturity. The species can move from fresh water to salt water and return with ease and is capable of large-scale migrations.

Races

Because of its wide natural distribution, it is not surprising that the striped bass has been differentiated into a number of races, or subpopulations. The striped bass in the Gulf of Mexico has formed a distinct race as a result of long separation from the southeastern Atlantic coast by the Florida peninsula. The striped bass of the Atlantic coast are divided into several races. The more important of them are in the Hudson River, upper and lower Chesapeake Bay, Albemarle Sound, and Santee-Cooper River. Analyses of the returns from tagged fish indicate little exchange between the striped bass of different areas. On the Pacific coast there appears to be little exchange between the striped bass of the San Francisco Bay region and the more northern race in Coos Bay and the Coquille and Umpqua Rivers in Oregon.

Spawning

The striped bass is anadromous; it ascends rivers from brackish or salt water to spawn. In some rivers, it goes far upstream on its spawning runs--more than 125 miles above Albemarle Sound in the Roanoke River and more than 75 miles above Chesapeake Bay in the Potomac River.

The spawning season for striped bass is governed primarily by water temperature and probably by other factors, and usually extends from April through June. The species is known to spawn when water temperatures are between 50° and 73° F., but most eggs are produced at about 65° F. The spawning population consists of males 2 or more years old and larger females 4 or more years old. During the spawning act, a single large female is surrounded by a few or many males. Spectacular "love play," that includes vigorous movements and splashing, but no combat, then ensues. These activities (locally sometimes called "fights") are really courtship antics and are accompanied by deposition of eggs.

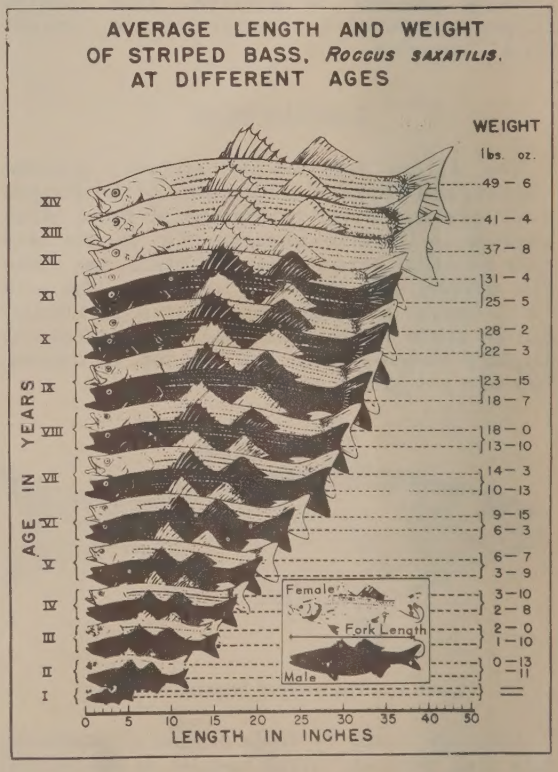
The semibuoyant eggs are carried downstream by the current or back and forth by tidal ebb and flow; they hatch in about 2 days at a water temperature near 65° F. The number of eggs produced by a female is in direct proportion to its weight--14,000 eggs by a 3-pound female and about 5 million by a 50-pound female.

The newly hatched striped bass live in open fresh and brackish waters, but when they are about one-half inch long, small schools of them move toward shore, where they stay at least through their first summer. During their second summer, when they are more than 6 in. (inches) long, they move down into the bays and sounds.

No positive method has been found of distinguishing the sex of striped bass by external features. In the spring, however, most of the larger males may be recognized by the ready flow of milt when the abdomen is squeezed.

Age and Growth

The striped bass grows rapidly early in its life as compared with some other species, but rate of increase in weight and length taper off after the 10th year (fig. 2). Females grow faster and live longer than do males.



(Photo courtesy of Chesapeake Biological Laboratory, Solomons, Md.)

Figure 2.--Average length and weight of striped bass at different ages.

They may live more than 40 yr. and reach the record size of 125 pounds, but specimens over 75 pounds are rare. The largest male on record was 45.5 in. long and weighed about 40 pounds.

The age of striped bass is determined by counting the annual growth marks on its scales, much as one tells the age of a tree by counting the rings in a cross section (fig. 3). The formation of an annual growth mark or ring (the annulus) is caused by the slowing down or almost complete cessation of growth in late winter or early spring. In addition to the determination of age, scale analysis has other important applications in studies of the life histories of fishes. The measurement of scales for calculations of growth in earlier years is often a method for determining the geographic origin of individual fish and provides a means of studying migrations.

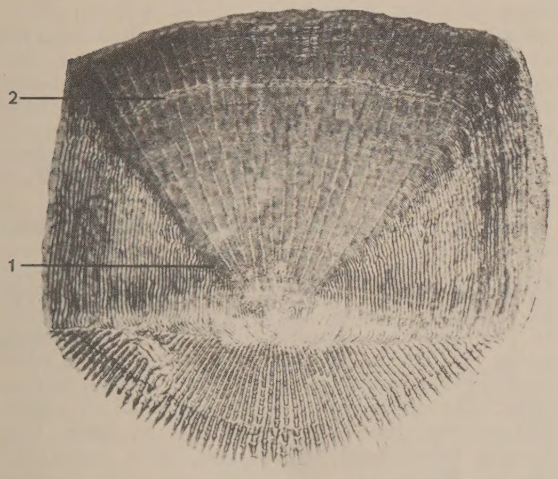


Figure 3.--Scale from a 3-yr.-old striped bass. The numbers 1 and 2 show year marks.

Food and Feeding

The feeding habits of this voracious, carnivorous fish differ according to age, size, habitat, and other factors. The larvae feed on zooplankton (tiny animals), and the young feed on small fish and worms and other fleshy invertebrates. When the young are about 6 in. long, they begin to feed on small schooling forage fish, soft-shell clams, "peeler" crabs, clamworms, and other marine forms. The adults feed on many kinds of fish, such as menhaden, river herring, anchovies, white perch, and spot; they also consume blue crabs and other invertebrates.

Migrations

The striped bass travels in schools. Although small numbers may be found at almost any time or place throughout its natural range, tagging studies (fig. 4) have shown the following

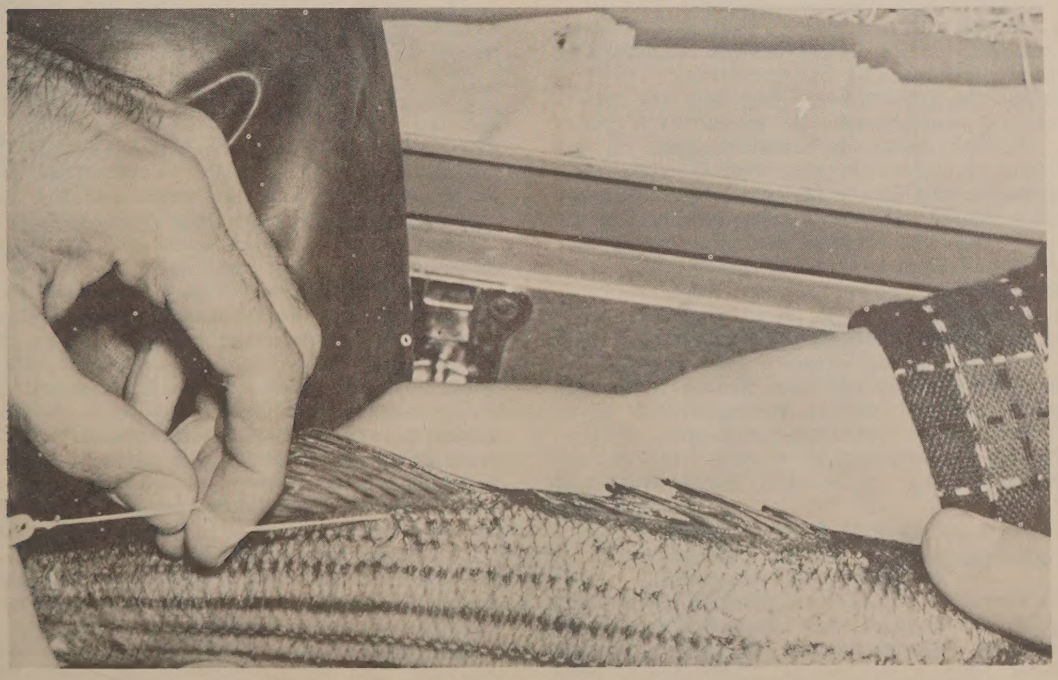


Figure 4.--Nylon streamer tag being attached to a striped bass.

basic trends in migration for the mass of the stocks: (a) in summer, they school near the surface on feeding migrations in the tributaries, bays, and ocean along the New England coast; (b) in autumn, schools move into lower tributaries and bays partly for feeding but primarily for overwintering; (c) in winter, they concentrate in a somewhat less active condition in the deeper waters of the lower tributaries and bays (in Chesapeake Bay they live as deep as 150 ft. (feet)); and (d) in spring, they move from the deeper waters, mature fish ascend rivers to spawn, and immature ones start on their feeding migration. The movement of striped bass on the Pacific coast is similar to that on the Atlantic coast, except that the fish move into fresh water in autumn and remain there over winter.

Some segments of the Atlantic coast stocks undertake coastal migrations. In late winter or early spring some striped bass from Albemarle Sound, Chesapeake Bay, and certain areas in New Jersey and New York move northward to New England waters, even to Canadian shores, where they remain during the summer. Then in autumn they move southward to New York and New Jersey and by early winter reach Chesapeake Bay and Albemarle Sound. Recoveries of Maryland and Virginia striped bass tagged in Chesapeake Bay showed that fish between 20 and 50 in. long (4 and 55 lb. (pounds)) have a definite tendency to travel between 100 and 700 miles from Chesapeake Bay; the largest fish usually traveled between 300 and 700 miles toward New England and Canada, whereas fish 10 to 20 in. long ($\frac{1}{2}$ to 4 lb.) traveled between 100 and 300 miles to areas off the Middle Atlantic and New England States.

Studies in Chesapeake Bay and its tributaries and the Roanoke River in North Carolina showed that adult fish tagged on the spawning grounds returned the following years to spawn in the same river where they were tagged. This evidence suggests a homing tendency, but the river in which these spawning fish had been hatched is not known.

ECONOMIC IMPORTANCE

The supply of striped bass has varied widely during the past century and probably since the fisheries for the species began. Fortunately, the abundance has been high enough in recent years to support large food and sport fisheries.

Commercial Fishery

The commercial catch of striped bass along the Atlantic coast has been increasing, despite minor fluctuations, during the past 3 decades (fig. 5). Today the annual commercial take

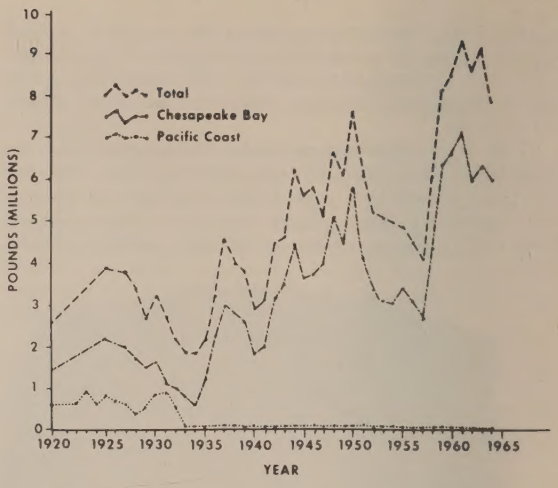


Figure 5.--Commercial catch of striped bass, 1920-65.

is more than 8 million pounds, worth about $2 million. During the winter when the supply is low and the demand high, the striped bass sells for 30 to 50 cents a pound to the consumer; but during spring when production is high, this price may drop to as low as 19 cents. Fishermen land their catches at many fish houses throughout the sounds, bays, and tributaries; there are few large centrally located dealers. Many of the fish are sold fresh locally or iced down and transported to Baltimore, Washington, Philadelphia, or New York. When catches are high and prevailing retail prices low, some catches are frozen by wholesale fish dealers for later sale.

The average annual commercial catch on the Pacific coast in 1920-32 was about three-quarters of a million pounds. In 1933, however, the catch decreased to less than 25,000 pounds (because of legal restrictions placed on the fishery) and has remained low to the present time. In 1931 California declared the striped bass a sport species and outlawed commercial netting.

Various commercial gear are used to take striped bass along the Atlantic coast. Gill nets produce about 50 percent of the catch; pound nets, 25 percent; haul seines, 15 percent; and all other gear, 10 percent. Most commercial gear are fished in the shoal areas of open bays and sounds or large tributaries, but drift gill nets are used in limited areas of deep water or in the narrow parts of certain tributaries. Most fishing is for pansize fish (12 to 16 in. long) weighing about 1 pound; 6- to 10-pound fish are common in the catch, however. Since 1963 the winter fishery by otter trawl along the New Jersey coast has made substantial catches.

On the Pacific coast, no commercial operators fish solely for striped bass; rather

they are caught incidently in the gill-net fishery for shad and other anadromous species, April through June.

Sport Fishery

Early historians noted that angling for striped bass was almost unexcelled, and one identified the species as the "boldest, bravest, strongest, and most active fish that visited tidal waters and bays along the Atlantic seaboard."

The sport catch of striped bass is substantial but mostly unrecorded. In Chesapeake Bay and Albemarle Sound, the sport catch is about equal to the commercial catch. On the basis of a census of 1 year's fishing, the Cooper Reservoir was estimated to yield 64,000 striped bass weighing 500,000 pounds. On the Pacific coast, the average annual catch is about 3 million fish, of which California produces more than 2 million. A study by the California Department of Fish and Game valued the State's sport fishery for striped bass at about $18 million per year (based on an average expenditure of $9 per-angler-day).

The sport catch of striped bass is taken by all types of fishermen from the highly specialized spin casters and trollers to the less skilled but eager bait angler. From southern New Jersey to Cape Cod, the striped bass is the unchallenged first choice of surf casters.

The weight of striped bass most commonly taken by sport fishermen varies from less than 1 pound to about 10 pounds, but individuals up to 25 pounds are by no means rare, and fish up to 50 pounds occasionally are caught. A striped bass weighing 65 pounds was caught on rod and line in Rhode Island in October 1936; one weighing 73 pounds was taken on rod and line in Vineyard Sound, Mass., in 1913.

RESEARCH AND MANAGEMENT

Effective management can be based only upon a thorough understanding of the biology of the striped bass and knowledge of the fisheries. Most States throughout the range of the species and the U.S. Fish and Wildlife Service are studying aspects of the life history, migration, size of stocks, harvest rates, and causes of fluctuations in abundance. Management policies, based on such research, have been initiated by the States in an effort to utilize the resource more effectively. These policies include: minimum and maximum size limits, daily bag limits, control of the amount and type of gear and season of fishing, and abatement of pollution. Hatcheries for the species are in operation on the Roanoke River at Weldon, N.C., and Santee-Cooper River at Moncks Corner, S.C.

Because fishing is governed by a number of different management policies, local State agencies should be consulted for details on their regulations.

The fisheries for striped bass are productive and essentially healthy now. Need exists, however, for more research to provide additional biological information for improvement in management procedures. Some of the major problems that affect the species are: changes in the environment resulting from water developments for hydroelectric power and navigation; increased domestic and industrial pollution; and increased competition between sport and commercial fishermen. Wiser utilization and management of this valuable resource is possible, but only through the coordinated efforts of local societies.

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